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# AdafruitPN532 Library Documentation

*Release 1.0*

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## Contents

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<b>1</b>	<b>Dependencies</b>	<b>3</b>
1.1	Installing from PyPI . . . . .	3
<b>2</b>	<b>Usage Example</b>	<b>5</b>
<b>3</b>	<b>Contributing</b>	<b>7</b>
<b>4</b>	<b>Building locally</b>	<b>9</b>
4.1	Zip release files . . . . .	9
4.2	Sphinx documentation . . . . .	9
<b>5</b>	<b>Table of Contents</b>	<b>11</b>
5.1	Simple test . . . . .	11
5.2	adafruit_pn532 . . . . .	12
5.2.1	Implementation Notes . . . . .	12
5.3	adafruit_pn532.i2c . . . . .	13
5.4	adafruit_pn532.spi . . . . .	13
5.5	adafruit_pn532.uart . . . . .	14
<b>6</b>	<b>Indices and tables</b>	<b>15</b>
	<b>Python Module Index</b>	<b>17</b>



CircuitPython driver for the [PN532 NFC/RFID Breakout](#) and [PN532 NFC/RFID Shield](#)



# CHAPTER 1

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## Dependencies

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This driver depends on:

- [Adafruit CircuitPython](#)
- [Bus Device](#)

Please ensure all dependencies are available on the CircuitPython filesystem. This is easily achieved by downloading the [Adafruit library and driver bundle](#).

### 1.1 Installing from PyPI

On supported GNU/Linux systems like the Raspberry Pi, you can install the driver locally [from PyPI](#). To install for current user:

```
pip3 install adafruit-circuitpython-pn532
```

To install system-wide (this may be required in some cases):

```
sudo pip3 install adafruit-circuitpython-pn532
```

To install in a virtual environment in your current project:

```
mkdir project-name && cd project-name
python3 -m venv .env
source .env/bin/activate
pip3 install adafruit-circuitpython-pn532
```





## CHAPTER 2

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### Usage Example

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Check `examples/pn532_simpletest.py` for usage example



## CHAPTER 3

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### Contributing

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Contributions are welcome! Please read our [Code of Conduct](#) before contributing to help this project stay welcoming.



### 4.1 Zip release files

To build this library locally you'll need to install the `circuitpython-build-tools` package.

```
python3 -m venv .env
source .env/bin/activate
pip install circuitpython-build-tools
```

Once installed, make sure you are in the virtual environment:

```
source .env/bin/activate
```

Then run the build:

```
circuitpython-build-bundles --filename_prefix adafruit-circuitpython-pn532 --library_
↪location .
```

### 4.2 Sphinx documentation

Sphinx is used to build the documentation based on rST files and comments in the code. First, install dependencies (feel free to reuse the virtual environment from above):

```
python3 -m venv .env
source .env/bin/activate
pip install Sphinx sphinx-rtd-theme
```

Now, once you have the virtual environment activated:

```
cd docs
sphinx-build -E -W -b html . _build/html
```

This will output the documentation to `docs/_build/html`. Open the `index.html` in your browser to view them. It will also (due to `-W`) error out on any warning like Travis will. This is a good way to locally verify it will pass.

## 5.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/pn532\_simpletest.py

```
1  """
2  This example shows connecting to the PN532 with I2C (requires clock
3  stretching support), SPI, or UART. SPI is best, it uses the most pins but
4  is the most reliable and universally supported.
5  After initialization, try waving various 13.56MHz RFID cards over it!
6  """
7
8  import board
9  import busio
10 from digitalio import DigitalInOut
11 #
12 # NOTE: pick the import that matches the interface being used
13 #
14 from adafruit_pn532.i2c import PN532_I2C
15 #from adafruit_pn532.spi import PN532_SPI
16 #from adafruit_pn532.uart import PN532_UART
17
18 # I2C connection:
19 i2c = busio.I2C(board.SCL, board.SDA)
20
21 # Non-hardware
22 pn532 = PN532_I2C(i2c, debug=False)
23
24 # With I2C, we recommend connecting RSTPD_N (reset) to a digital pin for manual
25 # hardware reset
26 reset_pin = DigitalInOut(board.D6)
27 # On Raspberry Pi, you must also connect a pin to P32 "H_Request" for hardware
```

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```

28 # wakeup! this means we don't need to do the I2C clock-stretch thing
29 req_pin = DigitalInOut(board.D12)
30 pn532 = PN532_I2C(i2c, debug=False, reset=reset_pin, req=req_pin)
31
32 # SPI connection:
33 #spi = busio.SPI(board.SCK, board.MOSI, board.MISO)
34 #cs_pin = DigitalInOut(board.D5)
35 #pn532 = PN532_SPI(spi, cs_pin, debug=False)
36
37 # UART connection
38 #uart = busio.UART(board.TX, board.RX, baudrate=115200, timeout=100)
39 #pn532 = PN532_UART(uart, debug=False)
40
41 ic, ver, rev, support = pn532.get_firmware_version()
42 print('Found PN532 with firmware version: {0}.{1}'.format(ver, rev))
43
44 # Configure PN532 to communicate with MiFare cards
45 pn532.SAM_configuration()
46
47 print('Waiting for RFID/NFC card...')
48 while True:
49     # Check if a card is available to read
50     uid = pn532.read_passive_target(timeout=0.5)
51     print('.', end="", flush=True)
52     # Try again if no card is available.
53     if uid is None:
54         continue
55     print('Found card with UID:', [hex(i) for i in uid])

```

## 5.2 adafruit\_pn532

This module will let you communicate with a PN532 RFID/NFC shield or breakout using I2C, SPI or UART.

- Author(s): Original Raspberry Pi code by Tony DiCola, CircuitPython by ladyada

### 5.2.1 Implementation Notes

#### Hardware:

- Adafruit PN532 Breakout
- Adafruit PN532 Shield

#### Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>
- Adafruit's Bus Device library: [https://github.com/adafruit/Adafruit\\_CircuitPython\\_BusDevice](https://github.com/adafruit/Adafruit_CircuitPython_BusDevice)

**exception** `adafruit_pn532.adafruit_pn532.BusyError`  
Base class for exceptions in this module.

**class** `adafruit_pn532.adafruit_pn532.PN532(*, debug=False, reset=None)`  
PN532 driver base, must be extended for I2C/SPI/UART interfacing

**SAM\_configuration()**  
Configure the PN532 to read MiFare cards.



**call\_function** (*command*, *response\_length=0*, *params=[]*, *timeout=1*)

Send specified command to the PN532 and expect up to *response\_length* bytes back in a response. Note that less than the expected bytes might be returned! Params can optionally specify an array of bytes to send as parameters to the function call. Will wait up to *timeout* seconds for a response and return a bytearray of response bytes, or None if no response is available within the timeout.

**get\_firmware\_version** ()

Call PN532 GetFirmwareVersion function and return a tuple with the IC, Ver, Rev, and Support values.

**mifare\_classic\_authenticate\_block** (*uid*, *block\_number*, *key\_number*, *key*)

Authenticate specified block number for a MiFare classic card. Uid should be a byte array with the UID of the card, block number should be the block to authenticate, key number should be the key type (like MIFARE\_CMD\_AUTH\_A or MIFARE\_CMD\_AUTH\_B), and key should be a byte array with the key data. Returns True if the block was authenticated, or False if not authenticated.

**mifare\_classic\_read\_block** (*block\_number*)

Read a block of data from the card. Block number should be the block to read. If the block is successfully read a bytearray of length 16 with data starting at the specified block will be returned. If the block is not read then None will be returned.

**mifare\_classic\_write\_block** (*block\_number*, *data*)

Write a block of data to the card. Block number should be the block to write and data should be a byte array of length 16 with the data to write. If the data is successfully written then True is returned, otherwise False is returned.

**ntag2xx\_read\_block** (*block\_number*)

Read a block of data from the card. Block number should be the block to read. If the block is successfully read a bytearray of length 16 with data starting at the specified block will be returned. If the block is not read then None will be returned.

**ntag2xx\_write\_block** (*block\_number*, *data*)

Write a block of data to the card. Block number should be the block to write and data should be a byte array of length 4 with the data to write. If the data is successfully written then True is returned, otherwise False is returned.

**read\_passive\_target** (*card\_baud=<sphinx.ext.autodoc.importer.\_MockObject object>*, *timeout=1*)

Wait for a MiFare card to be available and return its UID when found. Will wait up to *timeout* seconds and return None if no card is found, otherwise a bytearray with the UID of the found card is returned.

## 5.3 adafruit\_pn532.i2c

This module will let you communicate with a PN532 RFID/NFC shield or breakout using I2C.

- **Author(s):** Original Raspberry Pi code by Tony DiCola, CircuitPython by ladyada, refactor by Carter Nelson

**class** `adafruit_pn532.i2c.PN532_I2C` (*i2c*, \*, *irq=None*, *reset=None*, *req=None*, *debug=False*)

Driver for the PN532 connected over I2C.

## 5.4 adafruit\_pn532.spi

This module will let you communicate with a PN532 RFID/NFC shield or breakout using SPI.

- **Author(s):** Original Raspberry Pi code by Tony DiCola, CircuitPython by ladyada, refactor by Carter Nelson

**class** adafruit\_pn532.spi.**PN532\_SPI** (*spi, cs\_pin, \*, irq=None, reset=None, debug=False*)

Driver for the PN532 connected over SPI. Pass in a hardware or bitbang SPI device & chip select digitalInOut pin. Optional IRQ pin (not used), reset pin and debugging output.

adafruit\_pn532.spi.**reverse\_bit** (*num*)

Turn an LSB byte to an MSB byte, and vice versa. Used for SPI as it is LSB for the PN532, but 99% of SPI implementations are MSB only!

## 5.5 adafruit\_pn532.uart

This module will let you communicate with a PN532 RFID/NFC shield or breakout using UART.

- **Author(s):** Original Raspberry Pi code by Tony DiCola, CircuitPython by ladyada, refactor by Carter Nelson

**class** adafruit\_pn532.uart.**PN532\_UART** (*uart, \*, irq=None, reset=None, debug=False*)

Driver for the PN532 connected over Serial UART

## CHAPTER 6

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### Indices and tables

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- `genindex`
- `modindex`
- `search`



### a

`adafruit_pn532.adafruit_pn532`, [12](#)

`adafruit_pn532.i2c`, [13](#)

`adafruit_pn532.spi`, [13](#)

`adafruit_pn532.uart`, [14](#)



## A

adafruit\_pn532.adafruit\_pn532 (module), [12](#)  
adafruit\_pn532.i2c (module), [13](#)  
adafruit\_pn532.spi (module), [13](#)  
adafruit\_pn532.uart (module), [14](#)

## B

BusyError, [12](#)

## C

call\_function() (adafruit\_pn532.adafruit\_pn532.PN532  
method), [13](#)

## G

get\_firmware\_version() (adafruit\_pn532.adafruit\_pn532.PN532  
method), [13](#)

## M

mifare\_classic\_authenticate\_block()  
(adafruit\_pn532.adafruit\_pn532.PN532  
method), [13](#)  
mifare\_classic\_read\_block()  
(adafruit\_pn532.adafruit\_pn532.PN532  
method), [13](#)  
mifare\_classic\_write\_block()  
(adafruit\_pn532.adafruit\_pn532.PN532  
method), [13](#)

## N

ntag2xx\_read\_block() (adafruit\_pn532.adafruit\_pn532.PN532  
method), [13](#)  
ntag2xx\_write\_block() (adafruit\_pn532.adafruit\_pn532.PN532  
method), [13](#)

## P

PN532 (class in adafruit\_pn532.adafruit\_pn532), [12](#)  
PN532\_I2C (class in adafruit\_pn532.i2c), [13](#)  
PN532\_SPI (class in adafruit\_pn532.spi), [13](#)  
PN532\_UART (class in adafruit\_pn532.uart), [14](#)

## R

read\_passive\_target() (adafruit\_pn532.adafruit\_pn532.PN532  
method), [13](#)  
reverse\_bit() (in module adafruit\_pn532.spi), [14](#)

## S

SAM\_configuration() (adafruit\_pn532.adafruit\_pn532.PN532  
method), [12](#)